Leica mojo3D
User Manual

Version 1.0
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on the purchase of a Leica mojo3D system.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to Chapter 9, **Safety Directions** on page 83 for further information. Read carefully through this User Manual before you switch on the product.
To ensure safety when using the system, please also observe the directions and instructions contained in the User Manual and Safety Handbook issued by the:

- Agricultural machinery manufacturer.

Product identification

The type and serial number of your product are indicated on the type plate. Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorized service workshop.

Type: _____

Serial No.: _____

Symbols used in this manual

The symbols used in this manual have the following meanings.

Type	Description
Danger	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious personal injury.
Warning	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious personal injury.
Caution	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate personal injury, appreciable material, financial and environmental damage, or all of these.
☞	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Trademarks

All other trademarks are the property of their respective owners.

Table of Contents

Chapter **Page**

Table of Contents 1
1 System Overview 7
1.1 General Leica mojo3D System Information 7
1.2 Components of the Leica mojo3D System 7
1.3 Features and Specifications 8
1.3.1 Leica mojo3D Hardware 8
1.3.2 Leica mojo3D Software 8
1.3.3 Leica mojo3D Positioning 9
1.3.4 Leica mojo3D Guidance 9
1.3.5 Leica mojo3D Section Control and Mapping 10
2 System Installation 11
2.1 Before Installation 11
2.2 Antenna Installation 13
2.3 Leica mojo3D Installation 15
2.3.1 Before Installation 15
3 Running the Leica mojo3D for the First Time 17
3.1 Starting Up 17
3.2 Setting the Screen Calibration 17
3.3 Initial Setup Wizard 18
3.4 Menu Buttons at Right of Screen 27

3.5 Menu Buttons at Left of Screen 29
3.6 Specifying Data for Display 30
3.7 Error Notifications 33
3.8 Changing System Settings 34
3.9 Running the Setup Wizard at any Time 35
3.10 Features Selection 36
4 Setting Guidance Types 37
4.1 AB Parallel Guidance 37
4.2 A+ Heading Guidance 39
4.3 Fixed Contour Guidance 41
4.4 Pivot Guidance 43
4.5 Guidance Management 45
4.5.1 Changing the Name of a Wayline 45
4.5.2 Deleting an Individual Wayline 46
4.5.3 Deleting All Waylines 47
5 Field Treatments and Section Control 49
5.1 Starting a New Treatment 49
5.2 Managing Treatments 51
5.2.1 Changing a Treatment Name 53
5.2.2 Creating a PDF Report of a Treatment 53
5.2.3 Deleting a Treatment 54
5.3 Implement, Treatment Master and Spray Setup 56
5.3.1 Implement Setup 56
5.3.2 Spray Vehicle Setup 59

5.3.3 Treatment Master Input Settings 60
5.3.4 Section Setup 61
5.3.5 Automatic Section Control 63
5.4 Section Control Operations 65
6 NMEA Output 67
6.1 High–accuracy NMEA Output 67
6.1.1 Configuring NMEA Output 68
6.1.2 Logging NMEA Data 69
7 Virtual Wrench™ Remote Service 71
7.1 Virtual Wrench™ 71
7.2 Making a Service Request 72
7.3 Upgrading via USB Memory Stick 74
7.4 Upgrading Software from Virtual Wrench™ 75
7.5 Restoring Previous Software Version 76
7.6 Backing Up Current Software 77
7.7 Troubleshooting 78
7.8 Serial Numbers and Other System Information 79
8 Care and Transport 81
8.1 Transport 81
8.2 Storage 81
8.3 Cleaning and Drying 82
9 Safety Directions 83
9.1 General Introduction 83
9.2 Intended Use 84

9.3 Limits of Use 85
9.4 Responsibilities 86
9.5 Hazards of Use 87
9.6 Electromagnetic Compatibility (EMC) 94
9.7 FCC Statement, Applicable in U.S. 97
9.8 ICES-003 Statement, Applicable in Canada 98
9.9 Conformity to EU Directive 1999/5/EC 98
9.10 Labelling 99
10 Technical Data 103
10.1 Leica mojo3D Console Technical Data 103
10.1.1 General Technical Data 103
10.2 GPS Receiver 105
10.2.1 Specifications for GPS Receiver 105
10.3 GSM Wireless Module 107
10.3.1 Specifications for GSM Wireless Module 107
10.3.2 Specification for GPRS Data Transmission 108
10.4 HSDPA Wireless Module 109
10.4.1 Specifications for HSDPA Wireless Module 109
10.5 CDMA Wireless Module 110
10.5.1 Specifications for CDMA Wireless Module 110
10.6 GPS Antenna 112
10.6.1 Specifications for GPS Antenna 112
10.7 Cellular Antenna 114
10.7.1 Specifications for Cellular Antenna 114

11 International Limited Warranty, Software License Agreement 117
Appendix A Leica mojo3D with Single Section Control Kit 119
A.1 Single Section Control 119
Appendix B Leica mojo3D with Multi Section Control Kit 121
B.1 Multi Section Control 121
Appendix C Leica mojo3D with Electric Auto-Steer Kit 123
C.1 Electric Auto-Steer Kit 123
Appendix D Leica mojo3D with mojoRTK Kit 125
D.1 Leica mojoRTK Kit 125
Appendix E GNU General Public License 127
Glossary of Terms 129

1 System Overview

1.1 General Leica mojo3D System Information

General information

- Leica Geosystems' Leica mojo3D is a GPS–based guidance system that provides assisted steering to various pieces of agricultural equipment.
- Beyond its capabilities of steering accuracy, the Leica mojo3D also provides remote service and diagnostics, remote upgrades, and 24/7 service and assistance, thus eliminating costly on–site service calls.

1.2 Components of the Leica mojo3D System

Leica mojo3D components

The components supplied are as follows.

1. Leica mojo3D Display
2. GPS Antenna—standard
3. GPS Antenna Mounting Kit
4. Cell Modem Antenna—glass mount
5. Power Cable—standard
6. User Manual
7. Ram Mount—arm
8. Ram Mount—ball

1.3 Features and Specifications

1.3.1 Leica mojo3D Hardware

Leica mojo3D hardware features

- 7" colour display with feature–rich 3D graphics
- Touch–screen for menu navigation
- Rugged, water–resistant metal housing
- Simple installation, with RAM mount and colour–coded quick–install antennas
- Integrated L1 GPS receiver
- Integrated cell phone (GSM, GSM, or3G/3.5G)
- 12 volt operation
- Internal storage for waylines, worked areas, and settings
- USB interface for data transfer

1.3.2 Leica mojo3D Software

Leica mojo3D software features

- Intuitive software that allows for easy setup and use
- Day and night modes
- Upgrade, backup, and rollback of software through USB
- Virtual Wrench™, which provides remote support and over–the –air software upgrades

1.3.3 Leica mojo3D Positioning

Leica mojo3D positioning features

- GPS algorithms are tuned for the agricultural environment, with a pass–to–pass accuracy of 20 cm with SBAS and 50 cm autonomous
- Multi–link implement modelling, to provide high accuracy recording of worked areas
- NMEA (NMEA 0183) output for auxiliary devices that require GPS data
- Radar–out signal for auxiliary devices that require a radar speed signal
- Leica Twist compatible for terrain compensation
- Leica mojoRTK Console compatible, bringing RTK, Network RTK, and Dual Frequency Glide

1.3.4 Leica mojo3D Guidance

Leica mojo3D guidance features

- Multiple guidance patterns for visual guidance, including AB Parallel, A+ Heading, Fixed Contour and Pivot
- View in 3D perspective, with heads–up, chase, top–down, and north–up modes
- On–screen lightbar with heading assist operation
- Electric auto–steer capable, with the Leica Quick Steer and Twist
- Hydraulic auto–steer capable, with the Leica mojoRTK Console

1.3.5 Leica mojo3D Section Control and Mapping

Leica mojo3D section control and mapping features

- Single–section control using port expansion cable
- Multi–section control capability with Leica AS400
- Recording of worked area, with the ability to export data to a USB memory stick for archiving and reporting

2 System Installation

2.1 Before Installation

General installation information

Installation does not require specialist knowledge. The installer must read and study the included user manual, including the safety directions. The installer must be able to use the system in accordance with the user manual. However, Leica Geosystems recommends that installation of the Leica mojo3D equipment be performed by a qualified technician, because installation requires making electrical connections.

- The following instructions are to be used as a general guide during the installation of the Leica mojo3D.
- The system will not operate at peak performance if steering joints and linkage assemblies are not within the manufacturer's specifications. Check for worn steering components by turning the steering wheel. As the steering wheel is turned, the wheels should begin to move. If results are undesirable, please consult your vehicle manufacturers' maintenance manual.
- Install the system in a clean and dry workshop environment. Failure to do so may cause the system to short or promote product malfunction. **Any moisture on the roof of the vehicle** will also prevent the antenna mounting tape from sticking properly.

- Route and secure all cables and wiring to ensure that they do not chafe or rub, causing premature failure.
- The average installation time will vary, but it should be approximately two to four hours per vehicle. The time of installation may be more or less, based on vehicle type.

2.2 Antenna Installation

You should also refer to the installation hints specific to your tractor type and/or steer kit, if applicable. These details may be obtained at www.AgGuidance.com, or may have been supplied with your system, depending on how you purchased your system.

Preparations

1. Read all instructions before assembly and installation.
2. Clean the cab roof to prepare for the installation of the antennas. Approved cleaning products are denatured alcohol and Windex® glass cleaner.

Position of the GPS antennas

- The antenna should be mounted centrally on the roof of the vehicle, and as far forward on the roof as possible.
- If the Leica mojo3D is to be connected to a mojoRTK, then the mojo3D GPS antenna is not required.
- The Leica mojo3D cell radio antenna can be mounted directly on the inside of the tractor cabin glass, at least 2" (5 cm) from the surrounding metal frame.

Ensure that the antenna does not interfere with vision.

- Cables should be routed neatly back to the Leica mojo3D.
  - The antenna cables are color–coded and keyed, blue–to–blue and purple–to–purple.

mojoRTK antennas

The mounting of the mojoRTK antenna is described in the Leica mojoRTK User Manual.

Mounting the GPS antennas

Use the supplied cleaning wipes to clean the installation area.

Route the cables through existing grommets if possible; if not, modification may be required to route the cables to the desired location. If creating a new entry point, use a grommet to protect the cables.

The cables must not be cut, kinked, or bent tightly, as their performance will be degraded and system failure may result.

2.3 Leica mojo3D Installation

2.3.1 Before Installation

Before installation

Before installing the Leica mojo3D, carry out the following steps.

Check or prepare for Leica mojo3D power connection

1. Connect the supplied power cable to a reliable power source, for example, the tractor's main power system.
2. Route and secure all cables and wiring to ensure that there is no chafing or rubbing, which can cause premature failure.

3 Running the Leica mojo3D for the First Time

3.1 Starting Up

Starting up, step–by–step

1. To start the Leica mojo3D, press and hold the power button for two to three seconds.
2. The splash screen appears on the Leica mojo3D screen, and is replaced after system initialization by the screen calibration icon , which appears in the top left–hand corner of the screen. This icon is used to set the screen calibration (Section 3.2).

3.2 Setting the Screen Calibration

General information

Differences may exist between different devices, and so the screen calibration must be set before operation.

Setting the screen size, step–by–step

1. Tap (with your finger, not an object) the middle of the screen calibration icon, which is in the top left–hand corner of the screen. The icon will appear in another position. Continue to tap the middle of each icon until the corners and center of the screen are defined. You will need to tap the screen five times.
2. The Initial Setup Wizard appears on the screen. Tap the right arrow at the bottom of the screen to continue with the initial setup (Section 3.3).

3.3 Initial Setup Wizard

General information

- The language used in displays, screen brightness, country, units of length and speed, and display mode must be set. This information is stored in the Leica mojo3D, and may be backed up to a USB memory stick and restored.
- The brightness screen is the first initial setup screen to appear.

Brightness adjustment, step–by–step

1. Adjust the slider to vary the brightness of the screen, by using the left and right arrows.
2. Tap the right arrow at the bottom of the screen. The country selection screen appears.

Country selection, step–by–step

1. On the country selection screen, tap the button labelled with the flag of your country. Countries are listed in alphabetical order on the screen. If the required flag is not visible, tap the down arrow to display more flags.
2. After making your selection, tap the right arrow at the bottom of the screen. The language selection screen appears.

Language selection, step–by–step

1. On the languages screen, tap the button labelled with your required language.
2. Tap the right arrow at the bottom of the screen. The UTC time screen appears.

Time specification, step–by–step

1. On the UTC Time screen, use the up and down arrows to enter the local time, expressed as an offset from UTC time. Each tap will change the time offset by 30 minutes.
2. After selection, tap the right arrow at the bottom of the screen. The units selection screen appears.

Units selection, step–by–step

1. On the units selection screen, tap screen buttons to select measurement systems for length, speed, and area.
   - Lengths may be measured in metric, Imperial, or US Standard units.
   - Speeds may be measured in metric, Imperial, or US Standard units.
   - Areas may be measured in metric, Imperial, or US Standard units. The Imperial acre is the defined international acre, and the US acre is the slightly smaller US Survey acre.
2. After making your selections, tap the right arrow at the bottom of the screen. The mode selection screen appears.

Modes, step–by–step

1. On the mode selection screen, tap the buttons to select:
   - top–down mode (either north is at the top of the screen, or the direction of the front of the tractor is at the top of the screen), or
   - display mode (day mode, night mode, or automatic switch between modes).
2. After making your selections, tap the right arrow at the bottom of the screen. The vehicle setup screen appears.

Cell modem setup, step–by–step

The information required for cell modem setup is available from your cellular network provider.

APN Field

1. Tap the APN (Access Point Name) field. The on–screen keyboard appears.
2. Tap the keys on the on–screen keyboard to enter the name.

Tap the keyboard selection button, at the bottom left of the on–screen keyboard, to select keyboards with numbers and punctuation, or Cyrillic letters.

3. Tap the green tick symbol on the on–screen keyboard. The cell modem setup screen reappears.

Username Field

1. Tap the Username field. The on–screen keyboard appears.
2. Tap the keys on the on–screen keyboard to enter the user name.
3. Tap the green tick symbol on the on–screen keyboard. The Cell Modem setup screen reappears.

Password Field

1. Tap the Password field. The on–screen keyboard appears.
2. Tap the keys on the on–screen keyboard to enter the password.

3. Tap the green tick symbol on the on–screen keyboard. The Cell Modem Setup screen reappears.

SIM PIN

1. If you have been assigned a personal identification number (PIN) for the subscriber identity module (SIM) of the cell modem, tap the SIM PIN button, and then tap on the field that appears.
2. Enter the PIN by using the on–screen number pad.
3. Tap the green tick symbol on the on–screen keyboard. The on–screen keyboard closes.

If you make an error when entering the SIM PIN, it will be necessary to remove the SIM card and reset it by entering a Personal Unblocking Code (PUK), which you can obtain from your network provider.

Vehicle setup, step–by–step

1. On the implement setup screen, tap the vehicle type in the list at the left of the screen. Use the up and and down arrows to reveal more options.
2. Enter the data required for the vehicle type that you have selected.
   - Tap on a field. The on–screen keypad appears.
   - Tap on the keypad to enter data, and then tap the green tick symbol.
   - Repeat for the other data items required.
3. After you have entered all required vehicle data, add any required implement data on the same screen. If no implement data is required, tap the right arrow at

the bottom of the screen. If implement data is required, proceed to the next step.

Implement setup, step–by–step

To add implement data carry out the following steps.

1. On the implement setup screen, tap the green plus sign. A generic implement symbol appears in the bar at the top of the screen.

2. Tap on the implement symbol. On the implement setup screen that appears, tap the implement type in the list at the left of the screen. Use the up and down arrows to reveal more options.
3. Enter the data required for the implement type that you have selected.
   - Tap on a field. The on–screen keypad appears.
   - Tap on the keypad to enter data, and then tap the green tick symbol.
   - Repeat for the other data items required.
4. If more implements are required, tap the green plus sign and continue.
5. After you have entered all the required data, tap the right arrow at the bottom of the screen. The spray controller—implement mode screen appears.

Spray controller–implement mode setup, step–by–step

1. On the spray controller—implement mode setup screen, in the list at the left of the screen, tap the spray controller type.
2. Tap to select implement mode: sprayer mode or planter mode.

3. Tap the right arrow at the bottom of the screen. The master input source—input mode screen appears.

Master input source–input mode setup, step–by–step

1. On the master input source—input mode screen, in the list at the left of the screen, tap to select a master input source.
2. In the list at the right of the screen, tap to select an input mode.
3. Tap the right arrow at the bottom of the screen. The swath setup screen appears.

Swath setup, step–by–step

1. The swath setup screen initially shows one section, as a single blue bar near the top of the screen. To increase the number of sections, tap the plus (+) sign under the blue bar.
2. For the first section (shown in dark blue), enter the required information: tap on a field and use the on–screen numeric keypad to enter the new number. The following information, which applies to all sections, is required:
   - Section width—the width of the spray swath created by the section
   - Off latency (milliseconds)—time after an **off** event before the section is to be turned off
   - On latency (milliseconds)—time after an **on** event before the section is to be turned on
   - Overlap limit (percentage)—the percentage amount of overlap that is to be allowed before a section is timed off.

3. Tap the upper left or upper right arrow to move to a new section, and enter new, different data for the section.
4. When you have entered all required data for all spray sections, tap the right arrow at the bottom of the screen. The attached device selection screen appears.

Attached device selection, step-by-step

1. On the attached device selection screen, tap the icon that describes your setup. The available options are as follows.
   - Leica mojo3D (button at **top left** of screen)

   - Leica mojo3D with Leica Twist (button at **top right** of screen)

   - Leica mojo3D with Leica mojoRTK (button at **bottom left** of screen)

2. Tap the right arrow at the bottom of the screen. The NMEA configuration screen appears.

NMEA configuration, step-by-step

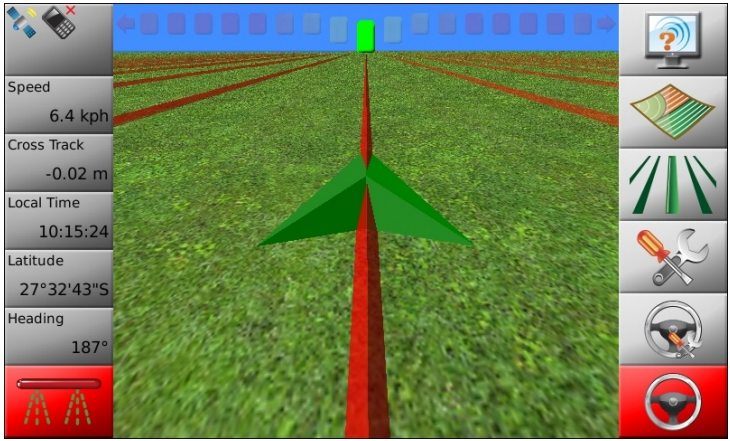
1. If NMEA output is required, tap the **Output NMEA** button.
2. If the NMEA output is to be logged to a USB memory stick, tap the **Log to USB** button.
3. Select a baud rate by using the up and down arrows.

4. Tap the right arrow at the bottom of the screen.

☞ Initial setup is now complete.

5. Tap on the right arrow at the bottom of the screen. The main navigation screen, an example of which is shown in Figure 3-1, appears.

Figure 3-1 Main Navigation Screen



The six screen buttons at the **right** of the main navigation screen, and the screen button at the bottom **left**, are used to control all Leica mojo3D operations.

3.4 Menu Buttons at Right of Screen

Menu buttons at right of screen

- The first four menu buttons on the right of the main navigation screen are, reading from top to bottom:
  - Service
  - Mapping
  - Guidance
  - Settings

  Tap on these buttons to display a menu. These menus are referred to as **flyout** menus. An example of a flyout menu is shown in Figure 3-2.
- The last two buttons on the right of the main navigation screen are, from top to bottom:
  - Steering Settings button
  - Autosteer button

  If the Leica mojo3D is being used on its own, then the Steering Settings button and the Autosteer button will be disabled.

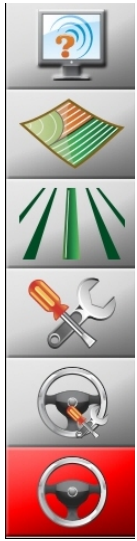
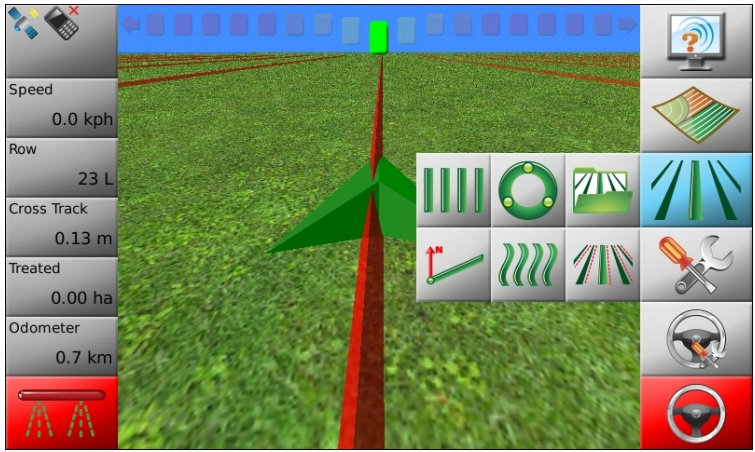


Figure 3-2 Flyout Menu Example

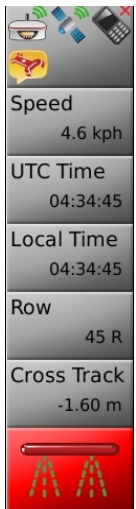


3.5 Menu Buttons at Left of Screen

Menu buttons at left of screen

The menu buttons at the left of the screen are, reading from top to bottom:

- Status button—tap the button to display a screen with status information and errors for—
  - Base station (if used)
  - Satellites visible
  - Cell modem signal strength
  - Virtual Wrench™
- Five buttons with user–selected data (see Section 3.6, Specifying Data for Display)
- On–screen treatment master input and status.



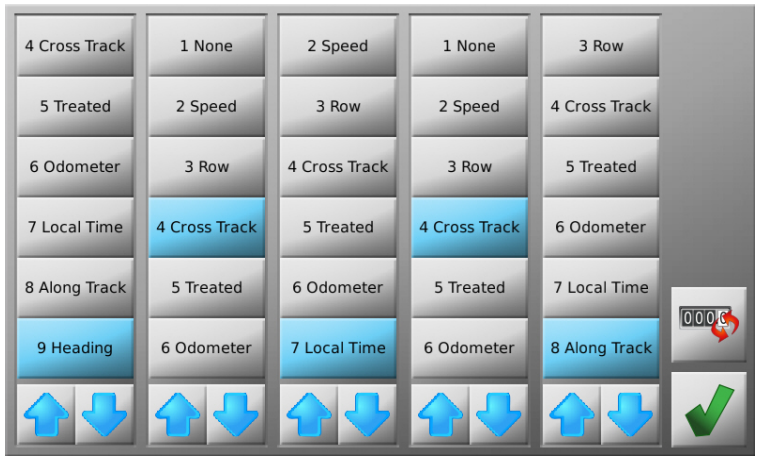
3.6 Specifying Data for Display

Specifying data for display, step-by-step

The items displayed at the left of the main navigation screen may be selected by the user. To specify the items for display, carry out the following steps.

1. Tap any of the data items in the left-hand menu on the main navigation screen. The item selection screen, shown in Figure 3-3, appears.

Figure 3-3 Display Data Selection Screen



2. In each column, tap an item for display (left-to-right order on this screen translates to top-to-bottom order on the main navigation screen). If necessary, use

the up and down arrows at the bottom of each column to reveal more of the selections available in each column.

3. To return the odomenter display to zero, tap the odometer icon at the right of the screen.
4. Tap the green tick symbol at the bottom right of the screen. The main navigation screen appears.

3.7 Error Notifications

General information

Lists of outstanding errors may be viewed at any time.

Viewing errors, step–by–step

To view lists of errors, carry out the following steps.

1. Tap the status button at the top left–hand corner of the screen. A list of status items appears: this list includes the number of satellites available, cell modem signal strength, and steering kit information.

2. To view a list of local errors, tap the local errors button.

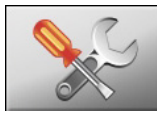
3. Tap on an error in the list to display more information.
4. To return to the main navigation screen, tap the green tick symbol at the bottom right of the screen.

3.8 Changing System Settings

Changing settings, step–by–step

The system settings—language used in displays, screen brightness, country, units of length and speed, and display mode—may be changed at any time. To select and change one of these items, carry out the following steps.

1. Tap the Settings button.



2. On the flyout menu, tap the system settings button.

3. Use the left and right arrows to scroll through the settings screens. Make any changes that are required.

3.9 Running the Setup Wizard at any Time

Running the Setup Wizard

The Setup Wizard may be run at any time, not just at first startup. To run the Startup Wizard, carry out the following steps.

1. Tap the settings button.

2. On the flyout menu, tap the wizard button. The brightness screen, which is the first of the settings screens, appears.

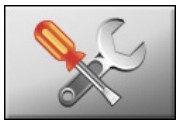
Use the left and right arrows to scroll through the settings screens. Make any changes that are required.

3.10 Features Selection

Features selection, step–by–step

To select a feature, carry out the following steps.

1. Tap the Settings button.



2. On the flyout menu, tap the features settings button. The features status screen appears, with a list of features and their availability—locked or unlocked.

3. To activate a new feature, tap the **Enter New Code** button. Use the on–screen keyboard to enter the new code.
4. To return to the main screen, tap the green tick symbol at the bottom right of the screen.

4 Setting Guidance Types

4.1 AB Parallel Guidance

General information

Waypoints are used to define a line in the field to which all working lines will be parallel. Waypoints must be set before auto-steer can be used.

☞ Before you can set waypoints, the system must have a good position fix.

Setting waypoints, step-by-step

To set waypoints, carry out the following steps.

1. Tap the Guidance button at the right-hand side of the screen.

2. On the flyout menu, tap the AB parallel guidance button.

3. Position your vehicle in the field at the point where you want to start (waypoint A), and tap the screen.
4. Drive to your desired endpoint in the field (waypoint B), and tap the screen when you arrive there.

☞ The minimum distance between waypoints A and B is 30 meters (100 feet). The greater the distance between the waypoints, the better the accuracy

of the working line. Where possible, set the waypoints at either end of the field.

5. On the dialog box that appears, tap:
   - the green tick symbol to save the wayline, or—
   - the red cross symbol to use the wayline without first saving it.

6. If you tap the green tick symbol save the wayline information, an on–screen keyboard appears. Enter a name for the wayline, and tap the green tick symbol at the bottom right of the screen.

4.2 A+ Heading Guidance

General information

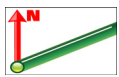
In A+ heading guidance, working lines are parallel, and are set by defining an initial waypoint and a compass bearing.

Before you can set the initial waypoint, the system must have a good initial fix.

Setting A+ guidance, step–by–step

To set up A+ heading guidance, carry out the following steps.

1. Tap the guidance button, which is shown on page 37.
2. On the flyout menu, tap the A+ guidance button.



3. Position your vehicle in the field at the point where you want to start (waypoint A), and tap the screen.
4. On the on–screen numeric keypad, enter the heading (compass bearing) for the wayline, and tap the green tick symbol.
5. On the dialog box that appears, tap:
   - the green tick symbol to save the wayline, or—

- the red cross symbol to use the wayline without saving it.

6. If you tap the green tick symbol to save the wayline information, an on–screen keyboard appears. Enter a name for the wayline, and tap the green tick symbol at the bottom right of the screen.

4.3 Fixed Contour Guidance

General information

In fixed contour guidance, working lines are parallel curves, and are set by defining an initial contour with a beginning and an ending waypoint.

Before you can set waypoints, the system must have a good position fix.

Setting fixed contour guidance, step-by-step

To set up fixed contour guidance, carry out the following steps.

1. Tap the guidance button, which is shown on page 37.
2. On the flyout menu, tap the fixed contour guidance button.

3. Position your vehicle in the field at the point where you want to start (waypoint A), and tap the screen.
4. Drive along the contour to waypoint B, and tap the screen when you arrive there.
5. On the dialog box that appears, tap:
   - the green tick symbol to save the wayline, or—
   - the red cross symbol to use the wayline without saving it.

6. If you tap the green tick symbol to save the wayline information, an on–screen keyboard appears. Enter a name for the wayline, and tap the green tick symbol at the bottom right of the screen.

4.4 Pivot Guidance

General information

A pivot guidance wayline comprises a circle through three specified points.

Before you can set waypoints, the system must have a good position fix (guidable position).

Setting pivot guidance, step-by-step

To set up pivot guidance, carry out the following steps.

1. Tap the guidance button, which is shown on page 37.
2. On the flyout menu, tap the pivot guidance button.

3. Position your vehicle in the field at the position where you want to start (waypoint A), and tap the screen.
4. Drive to waypoint B, and tap the screen when you arrive there.
5. Drive to waypoint C, and tap the screen when you arrive there.
6. On the dialog box that appears, tap:
   - the green tick symbol to save the wayline, or—

- the red cross symbol to use the wayline without saving it.

7. If you tap the green tick symbol to save the wayline information, an on–screen keyboard appears. Enter a name for the wayline, and tap the green tick symbol at the bottom right of the screen.

4.5 Guidance Management

4.5.1 Changing the Name of a Wayline

General information

The name under which a wayline is stored on the Leica mojo3D can be changed. (The actual data in the wayline cannot be changed, only deleted.)

Changing wayline name, step–by–step

To change the name of a stored wayline, carry out the following steps.

1. Tap the guidance button, which is shown on page 37.
2. On the flyout menu, tap the wayline management button.

3. Tap the name of the wayline that you wish to change, and then tap the edit button.

4. Use the on–screen keyboard to enter the new name for the wayline, and tap the green tick symbol at the bottom right of the screen.

The name is changed immediately: confirmation is not required.

4.5.2 Deleting an Individual Wayline

General information

A wayline stored on the Leica mojo3D can be deleted. Once a wayline has been deleted, it cannot be recovered, unless it has been backed up to a USB memory stick.

Deleting a wayline, step–by–step

To delete a stored wayline, carry out the following steps.

1. Tap the guidance button, which is shown on page 37.
2. On the flyout menu, tap the wayline management button.

3. Tap the name of the wayline that you wish to delete, and then tap the delete button.

4. On the dialog box that appears, tap:
   - the green tick symbol to confirm the deletion, or—

   - the red cross symbol to cancel the operation.

   - Tap the green tick symbol at the bottom right of the screen to return to the main navigation screen.

4.5.3 Deleting All Waylines

General information

All of the waylines stored on the Leica mojo3D can be deleted simultaneously. Once the waylines have been deleted, they cannot be recovered, unless they have been backed up to a USB memory stick.

Deleting all waylines, step-by-step

To delete all stored waylines, carry out the following steps.

1. Tap the guidance button, which is shown on page 37.
2. On the flyout menu, tap the wayline button.

3. On the screen that lists the names of the waylines, tap the delete all waylines button.

4. On the dialog box that appears, tap:
   - the green tick symbol to confirm the deletion, or—

   - the red cross symbol to cancel the operation.

- Tap the green tick symbol at the bottom right of the screen to return to the previous screen.

5 Field Treatments and Section Control

General information

- Field treatments record the coverage activity that the user initiates by tapping on the section control button.
- Treatment master data is added in real time to the current field treatments record.
- There is always a field treatment active.

5.1 Starting a New Treatment

Starting a new treatment, step–by–step

To start a new treatment, carry out the following steps.

1. On the main navigation screen, tap on the mapping button.

2. On the flyout menu, tap on the new treatment button.

3. On the dialog box that appears, tap:
   - the green tick symbol to start a new treatment, or—

- the red cross symbol to continue with the current treatment.

4. If you tap the green tick symbol, then the on-screen keyboard appears. Use the on-screen keyboard to enter a name for the treatment, and then tap the green tick symbol at the bottom right of the keyboard.

5.2 Managing Treatments

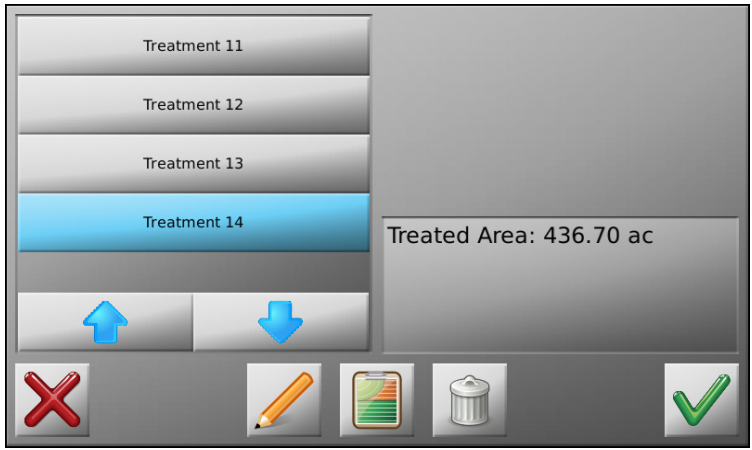
Managing treatments, step–by–step

To manage treatments, carry out the following steps.

1. On the main navigation screen, tap on the mapping button.

2. On the flyout menu, tap on the management button. The treatment management screen, shown in Figure 5-1, appears.

Figure 5-1 Treatment Management Screen



5.2.1 Changing a Treatment Name

Changing a treatment name, step–by–step

To change the name of an existing treatment, carry out the following steps.

1. Use the up and down arrows at the left of the Treatment Management screen (Figure 5-1) to scroll through the list of treatments. To select a treatment, tap on the treatment name.
2. Tap on the edit button at the bottom of the screen (the second button from the left). The on–screen keyboard appears.

3. Use the on–screen keyboard to change the name of the treatment, and then tap the green tick symbol at the bottom right of the keyboard.

5.2.2 Creating a PDF Report of a Treatment

General information

A PDF report on a particular treatment may be prepared and saved for later downloading to a USB memory stick.

Creating a PDF report, step–by–step

To create a PDF report on a particular treatment, carry out the following steps.

1. Use the up and down arrows at the left of the Treatment Management screen (Figure 5-1) to scroll through the list of treatments. To select a treatment, tap on the treatment name.

2. Tap the report button.

3. Tap the green tick symbol confirm that you wish to make a new report, or the red × symbol to abandon the creation.
   If you tap the green tick symbol, then the on–screen keyboard appears.
4. Use the on–screen keyboard to enter the name of the report, and then tap the green tick symbol at the bottom right of the keyboard.

5.2.3 Deleting a Treatment

Deleting a treatment, step–by–step

A treatment may be deleted. To delete a treatment, carry out the following steps.

1. Use the up and down arrows at the left of the Treatment Management screen (Figure 5-1) to scroll through the list of treatments. To select a treatment, tap on the treatment name.
2. Tap the delete button.

3. On the dialog box that appears, tap:
   - the green tick symbol to continue with the deletion, or—
   - the red cross symbol to abandon the deletion.

5.3 Implement, Treatment Master and Spray Setup

5.3.1 Implement Setup

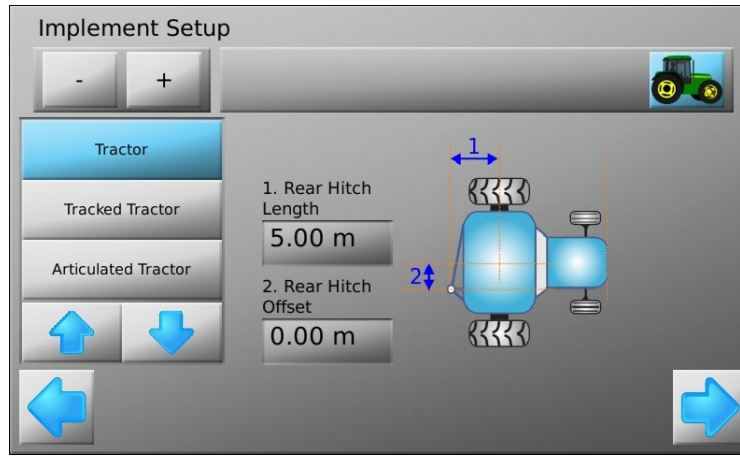
Implement setup, step–by–step

To specify an implement, carry out the following steps.

1. On the main navigation screen, tap the settings button (the third button from the top, on the right).

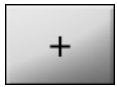
2. On the flyout menu, tap the implement settings button. The Implement Setup screen, an example of which is shown in Figure 5-2, appears.

Figure 5-2 Implement Setup Screen—Example

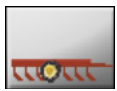


Vehicle type selection, step–by–step

1. To select a vehicle type, tap on a button in the list of vehicle types at the left of the Vehicle Setup screen. The on–screen diagram will show what measurements you will need to enter.
2. If the vehicle tows an implement, tap on the + button to add an implement.



3. Tap the implement symbol to highlight it.



4. Tap an implement type. Use the up and down arrows to reveal more selections.
5. Tap on each of the required measurement fields in turn, and use the on–screen keypad to enter the specified numbers. Tap the green tick symbol when finished.
6. When you have entered all required data, tap the right arrow at the bottom of the screen. The Spray Vehicle Setup screen appears.

5.3.2 Spray Vehicle Setup

Spray vehicle setup, step–by–step

1. On the Spray Vehicle Setup screen, tap to select the type of spraying vehicle. (There may be only one type of vehicle shown.)
2. Enter the data items requested for your section control vehicle type. To enter a number, tap on the field, and use the on–screen numeric keypad to enter the new number. Tap the green tick symbol when finished.
3. When you have entered all required data, tap the right arrow at the bottom of the screen. On the Spray Controller—Implement Mode screen, tap the name of the section controller and the implement mode (sprayer mode or planter mode).
4. Tap the right arrow at the bottom of the screen. On the screen that appears, tap the name of the section controller and the implement mode (sprayer mode or implement mode), and tap the right arrow at the bottom of the screen.
5. The Master Input Source—Input Mode screen appears.

5.3.3 Treatment Master Input Settings

Treatment settings

1. On the Treatment Master Input screen, tap to select the master input source.

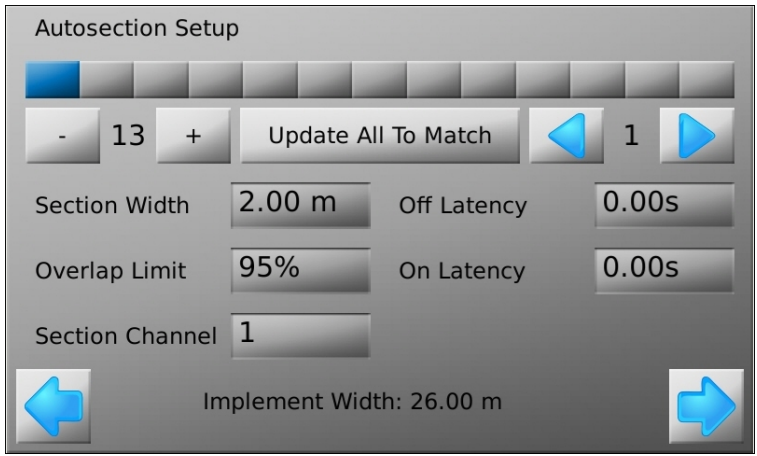
The treatment master input mode specifies the on–off master control over the on–screen coverage. This control is exercised by tapping the treatment master button at the bottom left of the main navigation screen. See Section 5.4, Section Control Operations for further details.

2. Tap to select a treatment master input mode, and then tap the right arrow at the bottom of the screen. The Swath Setup screen appears. An example is shown in Figure 5-3.

5.3.4 Section Setup

Autosection setup screen

Figure 5-3 Autosection Setup Screen



Autosection setup, step–by–step

1. The Swath Setup screen initially shows one section, as a single blue bar near the top of the screen. To increase the number of sections, tap the plus (+) sign under the blue bar.

2. For the first section (shown in dark blue), enter the required information: tap on a field and use the on–screen numeric keypad to enter the new number. The following information is required, for each section in turn:
   - Section width—the width of the spray swath created by the section
   - Off latency (seconds)—time taken for the section to turn off after the request is made
   - On latency (seconds)—time taken for the section to turn on after the request is made
   - Overlap limit (percentage)—the percentage amount of overlap allowed before a section is turned off or on.
3. You may apply the settings just entered to the other sections: tap the button labelled **Update All to Match**. Alternatively, tap the upper left or upper right arrow to move to a new section, and enter new, different data for the section.
4. When you have entered all required data for all spray sections, tap the right arrow at the bottom of the screen. The main navigation screen appears.

5.3.5 Automatic Section Control

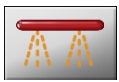
General information

Individual sections can be set to **on**, **off**, or **auto**.

Automatic section control, step–by–step

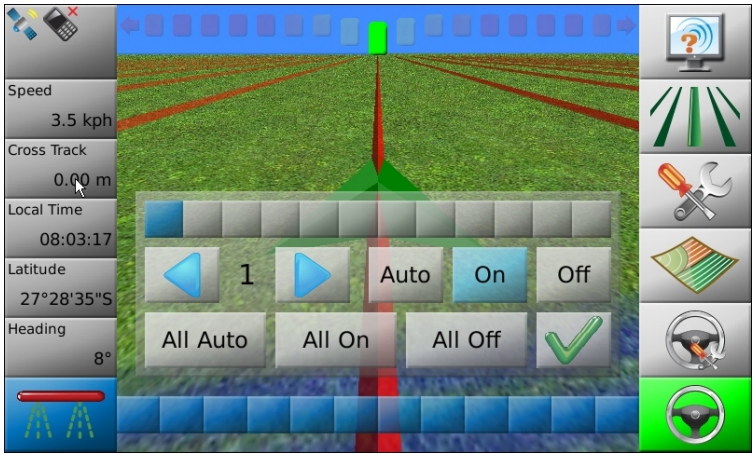
To configure automatic section control, carry out the following steps.

1. On the main navigation screen, tap the treatment master button at the lower left of the screen. A bar divided into sections appears at the bottom of the main navigation screen. (The number of sections is equal to the number set on the Section Control Setup screen in Section 5.3.4.)



2. Tap anywhere on the horizontal bar. The Section Control screen, shown in Figure 5-4, appears.

Figure 5-4 Section Control Screen



3. On the sectioned blue bar in the middle of the section control screen, tap on a section to select it, or use the left and right arrows to move from one section to another.

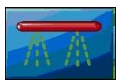
4. For each section, specify the section state by tapping **Auto**, **On**, or **Off**. The meanings of these terms are given in Section 5.4.
5. Alternatively, change all the settings at once by tapping **All Auto**, **All On**, or **All Off**.
6. Tap the green tick symbol. The selection control screen closes and the main navigation screen appears.

5.4 Section Control Operations

General information

The section control button may be red, yellow, or blue.

- **Treatment on—coverage recording (blue)**



- **Treatment on, but paused because of low speed (yellow)**

- **Treatment off (red)**

Terms

- **On**: The section will apply coverage when the blue section control button is tapped.
- **Off**: The section is turned off, and will not apply coverage.
- **Auto**: The section will apply coverage when the blue master treatment button is tapped, and a treatment has not already been applied.

6 NMEA Output

General information

- NMEA 0183 is a standard developed by the National Marine Electronics Association. The standard applies to communication between devices such as GPS receivers, echo sounders, sonars, anemometers, other marine devices, and a range of instruments.
- The Leica mojo3D on its own will produce NMEA output.
- If the Leica Twist or Leica mojoRTK is added as an attached device, then NMEA output with terrain compensation will be produced.

6.1 High–accuracy NMEA Output

Description

- The Leica mojo3D is capable of outputting position information in NMEA format.

Limitations

- The Leica mojo3D provides support only for the NMEA 0183 standard.
- The Leica mojo3D does not support flow control.
- The Leica mojo3D supports different baud rates, but the baud rate selected may limit how many sentences can be output and the rate at which they are output. For example, at low baud rates it is not possible to output all sentences at 10 Hz. The Leica mojo3D will detect this situation, display an error, and disable NMEA output. If you receive this error, switch to a higher baud rate or reduce the number and/or rate of sentences to be output.

6.1.1 Configuring NMEA Output

Configuring NMEA output, step-by-step

To configure NMEA output, carry out the following steps.

1. Tap the settings button, on the right-hand side of the main navigation screen.

2. On the flyout menu, tap the NMEA button. The NMEA configuration screen appears.

3. If NMEA output is required, tap the **Output NMEA** button.
4. If the NMEA output is to be logged to a USB memory stick, tap the **Log to USB** button.
5. Select a baud rate by using the up and down arrows.
6. Tap the right arrow at the bottom of the screen. The main navigation screen appears.

6.1.2 Logging NMEA Data

General information

The NMEA output can be logged to a USB memory stick for post–processing of the data.

Logging NMEA data, step–by–step

To enable logging of NMEA data, carry out the following steps.

1. The USB receptor is on the lower left front of the Leica mojo3D display, under a rubber cover. Lift the rubber cover and push the USB stick into the receptor
2. Tap on the Settings button, shown on page 68.
3. On the flyout menu, tap the NMEA button.
4. Tap the **Log to USB** option button.
5. To close the NMEA Configuration screen, tap the right arrow at the bottom of the screen.

Once NMEA logging has been turned on the NMEA sentences are logged to the USB memory stick as they are generated. The NMEA data is logged to a file named **nmea_log.txt** in the root directory of the USB memory stick.

Background information

The Leica mojo3D is capable of outputting the following NMEA sentences:

- **GPGGA** geographic coordinates
- **GPGLL** latitude and longitude
- **GPRMC** coordinates and direction
- **GPGSA** GPS satellites available
- **GPGSV** GPS satellites in view
- **GPVTG** velocity and direction

- **GPZDA** date and time (Zulu Date)
- **GPGST** noise statistics (position errors)

7 Virtual Wrench™ Remote Service

7.1 Virtual Wrench™

- To make a service request, you must first connect your Leica mojo3D to the Virtual Wrench™ system. Your console will then attempt to connect to Virtual Wrench™, and a service call will be flagged to the service technician. When prompted, enter the cell phone number on which you want the technician to call back.
- After you request service, the service technician can see your device configuration, performance, and even the display on your Leica mojo3D. The technician can also remotely press buttons on your behalf, to perform required actions or to guide you through the solution to your problem.

7.2 Making a Service Request

Making a service request, step-by-step

To make a service request to Virtual Wrench™, carry out the following steps.

1. Tap the service button at the right of the screen.

2. On the flyout menu, tap the service request button.

3. On the dialog box that appears, tap:
   - the green tick symbol to continue with the support request, or—

   - the red cross symbol to abandon the request.

4. if you tapped the green tick symbol, the phone numbers screen appears. Tap the phone number that you want the service technician to call. (If no phone number is stored, tap the Add button and use the on–screen number pad to enter the number.)
5. Tap the green tick symbols to return to the main navigation screen.

7.3 Upgrading via USB Memory Stick

General information

A later version of software may be installed from a USB memory stick. Carry out the following steps.

Upgrading software with a USB memory stick, step–by–step

Do not turn off the Leica mojo3D, or remove the USB memory stick, while the software upgrade is under way.

1. Insert the USB memory stick with the new software into the USB slot, which is at the lower left front of the display, under a rubber cover.
2. Tap the Service button, shown on page 72.
3. The Leica mojo3D will perform the software upgrade, and then request a restart.

Remove the USB memory stick only when the unit is powered down.

7.4 Upgrading Software from Virtual Wrench™

General information

A later version of software, if available, may be obtained by downloading from Virtual Wrench™.

Downloading software, step–by–step

To download a new version of software from Virtual Wrench™, carry out the following steps.

1. Tap the Service button, shown on page 72.
2. On the flyout menu, tap the download software button.

3. In the dialog box, tap the green tick symbol to proceed, or the red × symbol to abandon the request.

☞ After performing the download of the Leica mojo3D software, the system will request a restart.

7.5 Restoring Previous Software Version

General information

If you perform a software upgrade and there is an unforeseen problem that requires you to re–install a previous version of the software, you can restore the version of the software that was in use before the last upgrade.

Restoring previous software version, step–by–step

To restore a previous software version, carry out the following steps.

1. Insert a formatted USB memory stick, with at least 20 Mbyte of free space. The USB slot is at the lower left of the display, under a rubber cover.
2. Tap the Service button, shown on page 72.
3. On the flyout menu, tap the software restore button.

4. In the dialog box, tap the green tick symbol to proceed, or the red × symbol to abandon the request.

☞ After restoring the previous version of the Leica mojo3D software, the system will request a restart.

☞ Remove the USB memory stick only when the unit is powered down.

7.6 Backing Up Current Software

General information

Once you have installed new software by downloading from Virtual Wrench™, you can backup the new software onto a USB memory stick.

Backing up current software, step–by–step

To back up the new or current software onto a USB memory stick, carry out the following steps.

1. Insert the USB memory stick. The USB slot is at the left of the screen, under a rubber cover.
1. Tap the Service button, shown on page 72.
2. On the flyout menu, tap the backup to USB memory stick button.

3. In the dialog box, tap the green tick symbol to proceed, or the red × symbol to abandon the request.
4. The Leica mojo3D will save a copy of the current software onto the USB memory stick.

Remove the USB memory stick only when the unit is powered down.

7.7 Troubleshooting

Checking for errors, step-by-step

To check for errors, carry out the following steps.

1. Tap the Settings button, at the top left-hand corner of the screen.

2. For an overview of problems (number of satellites, cell modem signal strength, and steering kit status), tap the overview button.

3. for a list of local errors, tap the local errors button.

4. For a list of remote errors, tap the remote errors button.

7.8 Serial Numbers and Other System Information

General information

Information on serial numbers, software versions, and free space, both internal and on a USB memory stick, are available.

Displaying system information, step-by-step

To display serial numbers and other system information, carry out the following steps.

1. Tap the Service button, shown on page 72.
2. On the flyout menu, tap the system information button. Serial numbers, software versions, and free space information are displayed.

3. To display cell modem information, tap the cell modem button.

4. To display information on attached devices, tap the attached devices button.

8 Care and Transport

8.1 Transport

Shipping

When transporting the Leica mojo3D by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container or cardboard box, or an equivalent, in order to protect against shock and vibration.

8.2 Storage

Temperature limits

When storing or using the Leica mojo3D, observe the temperature limits. Take particular care if the equipment is inside a vehicle in summer. Refer to Chapter 10, Technical Data for information on temperature limits.

8.3 Cleaning and Drying

Product and accessories	• Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. • Do not use other liquids: they may attack the polymer components.
Dealing with damp products	• Dry the product and the accessories at a temperature not greater than 40°C (104°F) and clean them. • Do not repack until everything is completely dry.
Cables and plugs	• Keep plugs clean and dry. • If dirt is found in plugs, blow it out.

9 Safety Directions

9.1 General Introduction

Description

- The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.
- The person responsible for the product must ensure that all users understand these directions and adhere to them.

9.2 Intended Use

Permitted uses

- The Leica mojo3D is intended for agricultural and forestry use only.
- The Leica mojo3D is intended to be fitted to agricultural tractors only. It is not permitted to install this product in any other vehicles.
- Measuring raw data and computing coordinates using satellite signals.
- Data communication with external appliances.
- Guidance of approved agricultural equipment.

Adverse use

The following activities are considered adverse uses:

- use of the product without instruction
- use outside of the intended limits
- disabling safety systems
- removal of hazard notices
- opening the product using tools
- modification or conversion of the product
- use of products with obviously recognizable damages or defects
- use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems
- inadequate safeguards at a work site.

Warning

Adverse use can lead to injury, malfunction and damage.

It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed on how to work with it.

⚠ Warning

Unauthorized modification of agricultural machinery by mounting or installing the product may alter the function and safety of that agricultural machinery.

Precautions:
Follow the instructions of the machinery manufacturer. If no appropriate instruction is available, ask the machinery manufacturer for instructions before mounting or installing the product.

9.3 Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

⚠ Danger

Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

9.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH–9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.

Manufacturers of non–Leica Geosystems accessories

The manufacturers of non–Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of radio transmitters are respected.

⚠ Warning

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

9.5 Hazards of Use

Warning

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far–reaching human, material, financial and environmental consequences.

Precautions:
All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

Caution

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:
Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

Warning

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

Precautions:
Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.

Warning Only Leica Geosystems authorized service workshops are entitled to repair these products.

Caution If the accessories used with the product are not properly secured and the product is subjected to mechanical shock (for example, by blows or falling objects), the product may be damaged or personal injury may occur.

Precautions:
When setting–up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position.
Avoid subjecting the product to mechanical stress.

Caution The product uses the GPS P–Code signal which by U.S. policy may be switched off without notice.

Warning Incorrect fastening of the external antenna to vehicles or transporters poses the risk of the equipment being broken by mechanical influence, vibration, or airstream. This may result in accident and physical injury.

Precautions:
Attach the external antenna professionally. The external antenna must be secured additionally, for example, by use of a safety cord. Ensure that the mounting device is correctly attached and able to carry the weight of the external antenna (>1 kg) safely.

⚠ Caution

Installation near moving mechanical components may result in damage to the product.

Precautions:
Deflect the moving mechanical components as far as possible, and define a safe installation zone.

⚠ Caution

Beware of inadequate steering: crashes, other damaging events, or alterations to the machine may result in defective steering.

Precautions:
Periodically perform control measurements and field adjustments on the machine as specified in the User Manual.

⚠ Warning

While steering or navigating the machine, accidents may occur because of the failure of the operator to observe the surroundings (persons, ditches, traffic, etc), or because of malfunctions (caused by failure of system components, radio interference, etc).

Precautions:
The operator assures that the machine is operated, guided and monitored by a qualified user (e.g., a licensed driver). The user has to be able to take emergency measures, for example an emergency stop.

⚠ Danger

If the product is used with accessories, for example, masts, staffs, or poles, you may increase the risk of being struck by lightning. Danger from high voltages also exists

near power lines. Lightning, voltage peaks, or the touching of power lines can cause damage, injury and death.

Precautions:

- Do not use the product in a thunderstorm as you may increase the risk of being struck by lightning.
- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or in close proximity to power lines. If it is essential to work in such an environment contact the safety authorities responsible for electrical installations and follow their instructions.
- To prevent damages due to indirect lightning strikes (voltage spikes) cables, for example for antenna, power source or modem should be protected with appropriate protection elements, like a lightning arrester. These installations must be carried out by an authorized specialist.
- If there is a risk of a thunderstorm, or if the equipment is to remain unused and unattended for a long period, protect your product additionally by unplugging all systems components and disconnecting all connecting cables and supply cables.

Lightning conductors

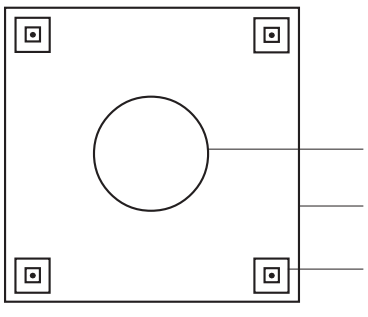
Suggestion for design of a lightning conductor for a GNSS system is as follows.

1. **On non-metallic structures**
   Protection by air terminals is recommended. An air terminal is a pointed solid or tubular rod of conducting material with proper mounting and connection to a conductor. The position of four air terminals should be uniformly distributed around the antenna at a distance equal to the height of the air terminal.
   The air terminal diameter should be 12 mm for copper or 15 mm for aluminium.

The height of the air terminals should be 25 cm to 50 cm. All air terminals should be connected to the down conductors. The diameter of the air terminal should be kept to a minimum to reduce GNSS signal shading.

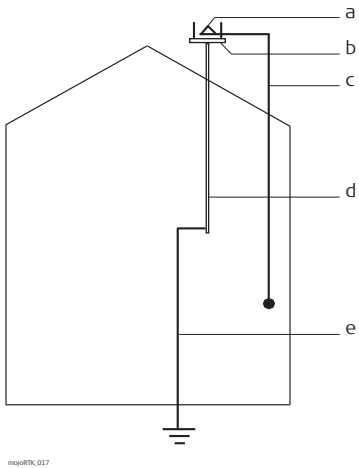
2. **On metallic structures**
   Protection is as described for non-metallic structures, but the air terminals can be connected directly to the conducting structure without the need for down conductors.

Air terminal arrangement, plan view



a) Antenna
b) Support structure
c) Air terminal

Grounding the receiver/antenna



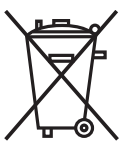
a) Antenna
b) Lightning conductor array
c) Antenna/receiver connection
d) Metallic mast
e) Connection to earth

⚠ Warning

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced, which may impair health.
- By disposing of the product irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:



The product must not be disposed of with household waste. Dispose of the product appropriately in accordance with the national regulations in force in your country. Always prevent access to the product by unauthorized personnel.

Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or obtained from your Leica Geosystems dealer.

9.6 Electromagnetic Compatibility (EMC)

Description

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

Warning

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards that are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

Caution

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two–way radios, non–standard cables or external batteries.

Precautions:
Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two–way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

⚠ Caution

Disturbances caused by electromagnetic radiation can result in erroneous measurements. Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation produced by, for example, nearby radio transmitters, two–way radios, or diesel generators.

Precautions:
Check the plausibility of results obtained under these conditions.

⚠ Warning

If the product is operated with connecting cables attached at only one of their two ends, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

Precautions:
While the product is in use, connecting cables must be connected at both ends.

Radios or digital cellular phones

Use of the product with radio or digital cellular phone is subject to the following warning.

Warning

Electromagnetic radiation can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.

Precautions:
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed or that humans or animals may be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio or digital cellular phone devices near to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.

9.7 FCC Statement, Applicable in U.S.

Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial enviroment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

9.8 ICES-003 Statement, Applicable in Canada

Warning

This Class (A) digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe (A) est conforme à la norme NMB-003 du Canada.

9.9 Conformity to EU Directive 1999/5/EC

Conformity to national regulations

Hereby, Leica Geosystems AG, declares that the Leica mojo3D is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

Class 1 equipment according to European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

The conformity for countries with other national regulations not covered by the European directive 1999/5/EC has to be approved prior to use and operation.

9.10 Labelling

Label placement on Leica mojo3D units

Labels are attached to the rear of the Leica mojo3D, as shown below.

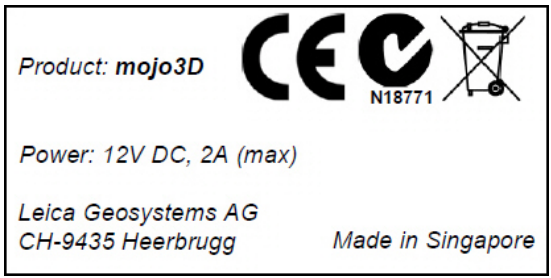
Label on Leica mojo3D CDMA units, type 777536

The label shown below appears on Leica mojo3D CDMA units, type 777536.

Product: ***mojo3D***	*Leica Geosystems AG*
Power: 12V DC, 2A (max)	*CH-9435 Heerbrugg*
	Made in Singapore
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)This Device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.	
This device contains TX FCC ID: N7N-MC5728	
This class A digital apparatus complies with Canadian ICES-003	

Label on HSDPA and GSM units– 777520 and 777533

The label shown below appears on Leica mojo3D HSDPA units, type 777533, and Leica mojo3D GSM units, type 777520.



10 Technical Data

10.1 Leica mojo3D Console Technical Data

10.1.1 General Technical Data

Design

Rugged water–resistant metal housing with a 7" colour display.

User interface

Display: 7" touch screen for menu navigation, 3D graphics, illumination
Keyboard: on–screen keyboard.

Dimensions

Height [cm]	Width [cm]	Depth [cm]
13.8	20.2	5.4

Weight

Weight without RAM mount ball[kg]/[lbs]
1.4 [3.1]

Power

Consumption [W]	External supply voltage
14	Nominal voltage 12 V DC (⎓) Voltage range 9 V-16 V

Environmental specifications

Temperature

Operating temperature	Storage temperature
-10°C to +60°C	-40°C to +85°C

Protection against water, dust and sand

Protection
IP54

Humidity

Protection
Up to 95 % The effects of condensation are to be effectively counteracted by periodically drying out the Leica mojo3D.

Interfaces

RS232: 2 x AMP 23–pin CAN: 2 x AMP 23–pin
USB: 1 x Front USB

Data format for RS232–Default Values

Dataformat for RS232–Default Values			
Baud rate:	9600	Parity:	None
Data bits:	8	Stop bits:	1

10.2 GPS Receiver

10.2.1 Specifications for GPS Receiver

Performance

Performance values quoted are typical values. Performance specifications are subject to GPS system characteristics, US DoD operational degradation, ionospheric and tropospheric conditions, satellite geometry, multipath effects, and the presence of intentional and unintentional interference sources.

Channel configuration

Channel configuration
12 GPS L1 + 2 SBAS

Horizontal position accuracy (RMS)

Horizontal position accuracy (RMS)
• Single Point L1: 1.5 m • SBAS (GPS only): 0.8 m

Measurement precision (RMS)

Measurement precision (RMS)
• L1 C/A Code: 8 cm • L1 Carrier Phase: 0.8 mm

Data rate

Data rate
• Measurements: Up to 10 Hz • Position: Up to 10 Hz

Time to first fix

Time to first fix
• Cold Start: 75 s (Typical value, with no almanac or ephemerides, and no approximate position or time.) • Hot Start: 45 s (Typical value, with almanac and recent ephemerides saved and approximate position and time entered.)

Signal re–acquisition

Signal re–acquisition
L1: < 1.0 s (typical)

Time accuracy

Time accuracy
20 ns RMS (Time accuracy does not include biases due to RF or antenna delay.)

Velocity accuracy

Velocity accuracy
<0.05 m/s RMS

Velocity

Velocity
515 m/s (US export licensing restricts operation to a maximum of 515 m/s.)

Antenna LNA power output

Antenna LNA power output
• Output Voltage: 5 V (nominal) • Maximum Current: 100 mA

10.3 GSM Wireless Module

10.3.1 Specifications for GSM Wireless Module

Specifications

Control via AT commands	Hayes 3GPP TS 27.007 and 27.005: Group 3, class 1
GPRS multi-slot	Class 12
Circuit-switched data	Up to 14.4 kbps (Hayes 3GPP TS 27.007 and 27.005)
SIM application toolkit	Release 99

Supply voltage range	3.2 V to 4.5 V
Operational temperature range	• –40°C to +85° • Switch off: ›+85°C

10.3.2 Specification for GPRS Data Transmission

Specifications

GPRS class 12	Max. 86 kbps (DL and UL)
Coding schemes	CS 1—4
Approvals	• CE, R&TTE, GCF, UL, FCC, IC, PTCRB • Local approvals and network operator certifications

10.4 HSDPA Wireless Module

10.4.1 Specifications for HSDPA Wireless Module

Specifications

Technology	• UMTS with HSPA Category 8 (7.2 Mbps downlink) • HSUPA Category 5 (5.76 Mbps uplink) • EDGE/GPRS MS Class 12 • Diversity on 850/900/1900/2100 MHz • USIM support
Antenna diversity support	850/900/1900/2100 MHz

Bands	• 850/900/1900/2100 MHz WCDMA
	  • Power class 3 (+24dBm)
	• 850/900 MHz GSM/GPRS/EDGE
	  • GSM Power class 4/EDGE E2
	• 1800/1900 MHz GSM/GPRS/EDGE
	  • GSM Power Class 1/EDGE E2
	• GPS/1575.42 MHz

Data services	• 850/900/1900/2100 MHz WCDMA
	  • Downlink up to 7.2 Mbps
	  • Uplink up to 5.76 Mbps
	• 850/900/1800/1900 MHz
	  • Downlink up to 236 kbps
	  • Uplink up to 236 kbps

10.5 CDMA Wireless Module

10.5.1 Specifications for CDMA Wireless Module

Specifications

Frequency bands	• Dual Band
	  • 800 MHz North American cellular band
	  • 1900 MHz North American PCS band
	• Supports RX diversity in both 800 MHz and 1900 MHz bands.
	• GPS Band

CDMA standards	• IS–856–A (CDMA 1xEV–DO Revision A) • IS–856 (CDMA 1xEV–DO Rel 0) • IS–2000 (CDMA 1xRTT) • IS–95 A/B • IS–707–A Data • IS–637–A SMS • IS–683–A Service Provisioning • IS–683–B (partial)
Data services	• CDMA 1xEV–DO Revision A (IS–856–A) • Forward link up to 3.1 Mbps • Reverse link 1.8 Mbps • CDMA 1xEV–DO Rel 0 (IS–856) • Forward link up to 2.4 Mbps • Reverse link 153.6 kbps • CDMA 1xRTT (IS–2000) • Forward and reverse link speeds up to 153.6 kbps
Safety	At least 20 cm (7.88") separation distance between the antenna and the user's body must be maintained at all times.

10.6 GPS Antenna

10.6.1 Specifications for GPS Antenna

Specifications

Dielectric antenna	• Centre frequency: 1575.45 MHz ± 3 MHz • V.S.W.R.: 1.5:1 • Band width: ±5 MHz • Impedance: 50 ohm • Peak gain: >3 dBic based on 7 cm × 7 cm ground plane • Gain coverage: >–4 dBic at –90°<θ<+90° (over 75% volume) • Polarization: RHCP

LNA/Filter	• LNA Gain (without cable): 13 dB/26 dB/28 dB/other
	• Typical Noise Figure: 1.5 dB
	• Filter Out Band Attenuation: (f_0 = 1575.42 MHz)
	  • 7 dB Min f_0 ± 20 MHz
	  • 20 dB Min f_0 ± 50 MHz
	  • 30 dB Min f_0 ± 100 MHz
	• V.S.W.R.: <2.0
	• DC voltage: 2.7 V/3.0 V/3.3 V/5.0 V/3.0 V to 5.0 V/other
	• DC current: 5 mA/11 mA/15 mA max

Dimensions of base	• Lenghth: 44 mm • Width: 35.5 mm • Height: 14 mm
Weight of base	< 110 g
Base mounting method	Magnetic
Antenna length	3 metre
Antenna type	Patch
Temperature	• Operating temperature: –40°C to +85°C • Storage temperature: –45°C to +100°C
Vibration	Sine sweep 1g (0–p) 10~50~10 Hz each axis
Connector	Fakra (Blue; Key: C Type)
Humidity	95%~100% RH
Protection against water	Waterproof

10.7 Cellular Antenna

10.7.1 Specifications for Cellular Antenna

Specifications

Dimensions	• Length: 115 mm • Width: 22 mm • Thickness: 4 mm
Weight	56 g
Compatibility	• Frequency Range (MHz): 824–960 MHz, 1710–1990 MHz • Bandwidth (MHz): 136/280 • V.S.W.R.: ≤ 1.5 • Gain: 2 dBi • Maximum power input: 60 W • Input impedance: 50 Ω
Antenna type	Dipole
Polarization type	Vertical
Length	3 metre
Connector	Fakra (Bordeaux; Key: D Type)
Cable type	RG174

Antenna mounting method	Adhesive

Operating characteristics

Band	**CDMA800 and GSM900**		**DCS1800 and PCS1900**	
Frequency (MHz)	824	960	1710	1990
Return Loss (dB)	–13.01	–16.78	–22.01	–22.11
SWR	1.576	1.339	1.172	1.170

Frequency band

Type	**Frequency band [MHz]**
GPS receiver	L1: 1575 ± 23
CDMA	850/900/1900/2100
HSDPA	850/900/1900/2100

Antenna

Type	Antenna	Gain [dBi]	Connector	Frequency band [MHz]
GPS receiver L1	Patch (GNSS)	27	Fakra (Blue; Key: C Type)	L1: 1575 ± 33
Cellular	Dipole	2	Fakra (Bordeaux; Key: D Type)	824–960 MHz, 1710–1990 MHz

11 International Limited Warranty, Software License Agreement

International limited warranty

This product is subject to the terms and conditions set out in the International Limited Warranty which you can download from the Leica Geosystems home page at:

- http://www.leica-geosystems.com/internationalwarranty

or collect from your Leica Geosystems distributor.

The foregoing warranty is exclusive and is in lieu of all other warranties, terms or conditions, express or implied, either in fact or by operation of law, statutory or otherwise, including warranties, terms or conditions of merchantability, fitness for a particular purpose, satisfactory quality and non-infringement, all of which are expressly disclaimed.

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Appendix A Leica mojo3D with Single Section Control Kit

A.1 Single Section Control

General information

- Single section control is available as an option for the Leica mojo3D. The Leica mojo3D has built–in capability to control a single section for a planter, sprayer, or spreader. Using the feature will require an additional cable.
- The interface for this control is a simple relay, which allows the single section control kit to be used in a wide range of applications.

Accessories required

- Leica mojo3D Port Expansion Cable.

Appendix B Leica mojo3D with Multi Section Control Kit

B.1 Multi Section Control

General information

- The Leica mojo3D via the multi section control kit can control multiple sections for a planter, sprayer, or spreader. This option allows for multiple sections to be individually controlled, automatically or manually, in order to minimise overlap.
- Using the feature will require additional hardware.
- The interface for this control is a simple voltage control, which allows the multi–section control kit to be used with a wide range of third party rate controllers.
- The interface also provides a single and bipolar master input sense.

Accessories required

- Multi–section control kit.
- Leica mojo3D Port Expansion Cable.

Appendix C Leica mojo3D with Electric Auto–Steer Kit

C.1 Electric Auto–Steer Kit

General information

- The Electric Auto–Steer Kit, an option for the Leica mojo3D, turns the visual guidance product into an auto–steer product. The Electric Auto–Steer Kit adds:
  - terrain compensation via the Leica Twist, and
  - electric auto–steer via the Leica Quick Steer.
- All visual guidance patterns—AB Parallel, A+ Heading, Fixed Contour and Pivot—are available for auto–steer.

Accessories required

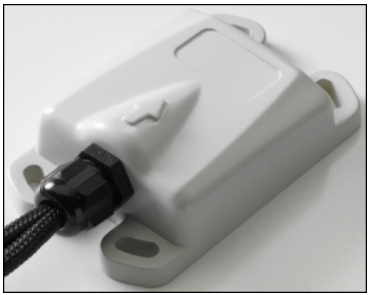
- Electric Auto–Steer Kit.

Installation instructions

- Refer to www.AgGuidance.com, **How to Guides**, for installation and operating instructions for the Leica Quick Steer.
- Install the Leica Twist in a secure location where–
  - movement in relation to the vehicle frame is eliminated and
  - the arrow on the housing points forward.

Label on Leica Twist

A label is attached to the rear of Leica Twist units, in the indentation on the housing shown below.



Product: Leica TWIST
Power: 13.8V DC, 0.2A (max)
Leica Geosystems AG
CH-9435 Heerbrugg
N18771
Made in Singapore

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)This Device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Appendix D Leica mojo3D with mojoRTK Kit

D.1 Leica mojoRTK Kit

General information

- The Leica mojoRTK Console brings RTK positioning and advanced hydraulic steering kit options to the Leica mojo3D display. This feature is activated by default on connection.
- The Leica mojoRTK Kit allows for full integration of all Leica mojoRTK Console features into the Leica mojo3D interface.
- The Leica mojoRTK Kit brings superior performance in positioning, and can utilise the terrain compensated features of the Leica mojoRTK Console. These features include:
  - Leica mojoRTK base station compatibility, and
  - optional Network RTK capability.

Accessories required

- Leica mojoRTK Console
- Leica mojoRTK External Control Cable
- Leica mojo3D Port Expansion Cable

Appendix E GNU General Public License

Leica mojo3D software

This product contains some software covered by the GPL V2 license and this statement hereby constitutes an offer, valid for at least three years, to give any third party, for a charge of physically performing source distribution, a complete machine–readable copy of the corresponding source code. For detailed license terms and additional information look at www.AgGuidance.com.

Glossary of Terms

Almanac
Almanac data is used to predict which satellites are visible, and thus shorten search times.

Base
A source of the correction signals for the RTK solution. May also be referred to as: base station, reference station and network reference station.

C/A code
The Coarse/Acquisition GPS code modulated on the GPS L1 signal. This code is a sequence of 1023 pseudorandom binary biphase modulations on the GPS carrier at a chipping rate of 1.023 MHz, thus having a code repetition period of one millisecond.

CAN bus
The CAN bus (Controller Area Network bus) is a specialized internal communications network that interconnects components inside a vehicle.

A network inside a vehicle must meet specific requirements: these include assurance of message delivery, no conflict between messages, minimum time for delivery, low cost, and ability to operate reliably in an electrically noisy environment. Conventional computer network technologies, such as Ethernet, are rarely used in vehicles.

CDMA
Code Division Multiple Access. CDMA refers to any of a number of protocols used in second–generation (2G) and third–generation (3G) cell phones. CDMA uses multiplexing, which allows many signals to be transmitted in a single channel. The frequency of a signal is varied according to a code (defined pattern), so that the signal can be picked up only by a receiver that holds the same code.

CMR
Compact Measurement Record. This is an RTK correction protocol.

EDGE
Enhanced Data rates for GSM Evolution. The EDGE protocol allows improved data transmission rates, as an extension of standard GSM. EDGE is a third–generation (3G) technology.

Ephemeris
A list of positions or locations of a celestial object as a function of time.

GPS
GPS is the short form of NAVSTAR GPS, which stands for **NAV**igation **S**ystem with **T**ime **A**nd **R**anging **G**lobal **P**ositioning **S**ystem.

GSM
GSM (Global System for Mobile communications: from the original Groupe Spécial Mobile) is the most common standard for cell phones. Both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system.

HSDPA
High–Speed Downlink Packet Access. HSDPA is a protocol for cell phone data transmission. It is referred to as a 3.5G technology (G stands for Generation). The HSDPA protocol provides download speeds on a cell phone that are equivalent to ADSL (Asymmetric Digital Subscriber Line) downloads on a landline. HSDPA evolved from, and is an improvement on, the W–CDMA protocol (a 3G protocol).

Latitude
The angle between the ellipsoidal normal and the equatorial plane. Latitude is zero on the equator and 90° at the poles.

Longitude
Longitude is the angle between the meridian ellipse which passes through Greenwich and the meridian ellipse containing the point in question. Thus, longitude is 0° at Greenwich and is measured either eastward through 360° or eastward 180° and westward 180°.

NMEA
National Marine Electronics Association.

NMEA 0183
NMEA 0183 is a combined electrical and data specification for communication between marine electronic devices such as echo sounder, sonars, anemometer (wind speed and direction), gyrocompass, autopilot, GPS receivers and many other types of instruments.

NTrip
Networked Transport of RTCM via Internet Protocol.

Post processing
The process of computing positions in non–real–time, using data previously collected by GPS receivers.

RTCM
Radio Technical Commission for Maritime Services. RTCM3 is an RTK correction protocol.

RTK
Real Time Kinematic. A term used to describe the procedure of resolving the phase ambiguity at the GPS receiver, so that the need for post–processing is removed.

SBAS
Satellite Based Augmentation System. SBAS comprises a number of ground stations at surveyed points. The ground stations take measurements of GPS satellites, their signals, and environmental factors that may affect the signals received by users, and create adjustment messages to send to one or more satellites for broadcast to users.

W–CDMA
Wideband Code–Division Multiple Access. An ITU standard derived from Code–Division Multiple Access (CDMA). W–CDMA is a third–generation (3G) cell phone technology that promises much higher data speeds than other protocols.

Total Quality Management: Our commitment to total customer satisfaction.

Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

Ask your local Leica Geosystems dealer for more information about our TQM program.

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- when it has to be **right**

Leica Geosystems